Stock Annex: Kitefin shark (*Dalatias licha*) in subareas 1–10, 12 and 14 (the Northeast Atlantic and adjacent waters)

Stock specific documentation of standard assessment procedures used by ICES.

Stock: Kitefin shark

Working Group: Working Group on Elasmobranch Fishes (WGEF)

Created:

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Last updated:

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General

Stock distribution

Kitefin (*Dalatias licha*) is widely distributed. It is a warm temperate and tropical cosmopolitan species found between 60º N and 48º S. It is an epibenthic species, but often ranges well-off the bottom, living at depth ranging from 40 to 1800 m (Compagno, 1984). In the Eastern Atlantic it is found from Iceland to Cameroon (Iceland, Scotland, and Irish Atlantic slope to Morocco, western Mediterranean, Azores, Canaries and from Madeira to Cameroon) (Compagno, 1984; Krefet and Tortonese, 1973).

It is also found in the Western Atlantic (Georges Bank and northern Gulf of Mexico), Western Indian Ocean (Mozambique and South Africa), Western Pacific (Japan, Autralia, and New Zealand) and in the Central Pacific (Hawaii).

WGEF considers there to be a single-stock of kitefin (*Dalatias licha*) in the ICES area. The stock area covers ICES Subareas 5–10. The stock identity of kitefin shark in the NE Atlantic is unknown. However the resource seems to be more abundant in the southern area of the Mid Atlantic Ridge (ICES Area 10). Elsewhere in the NE Atlantic, kitefin shark is recorded infrequently. For assessment purposes the Azorean stock (ICES Subarea 10) is considered as a management unit.

The fishery

Historically an important target fishery was in place in the Azores from the seventies to the end of the nineties. A detailed description of the fisheries can be found in Heessen, 2003; ICES, 2003 and Machado *et al.*, 2004.

Currently there are no targeted commercial fisheries for kitefin in the northeastern Atlantic, though they are taken as a bycatch in trawl and hook and line fisheries. Most of the landings nowadays are a residual bycatch from the Azorean demersal mixed hook and lines fisheries (Subarea X) (ICES, 2008).

As for almost all deep-water sharks around the Azores species misidentification may occur on the catch and landing statistics (Pinho, 2005).

Catch data

Landings

Landings by country and subarea have been reported to ICES (Table 1). For most countries *Dalatias licha* may be reported under a mixed deep-water sharks' category or when species-specific landings are reported misidentification may occur. The degree of possible misreporting or underreporting is however not known.

Discards

Discards are suspected to occur on the Azorean longliners because the distribution of the stock matches with the fishing area and effort distribution of deep-water fisheries (Pinho, 2005).

Scattered and lower level of kitefin discards were reported from the Spanish trawl fleets operating on the Iberian waters (Division 8.c, 9.a) (Santos *et al.*, 2010).

Quality of catch data

Landings data in the Azores is collected on the auctions and kitefin data may be considered of reasonable quality. However, deep-water sharks taken in the Azores are usually gutted, finned, beheaded and also skinned. Only the trunks and, in some cases, the livers are used. Species misidentification is a problem with deep-water sharks in general. The Azorean landings data reported to ICES come exclusively from the commercial first sale of fresh fish on the auctions. Therefore, data reported may be an underestimate of total landings (Pinho, 2005).

Biological data is not collected on the port sampling program under the Data Collection Regulations. Some generic biological data are available (Silva, 1988).

Commercial catch composition

Data is collected by species on the Azores auctions. However, for deep-water sharks misidentification is a problem.

Commercial catch–effort data

There are very limited cpue data available for the ICES area and corresponds to the historical Azorean fishery (see Heessen, 2003 and ICES, 2003).

Fishery–independent information

Survey data is very limited because the existing surveys on the North East Atlantic rarely catch kitefin shark. In the Azores only 25 individuals were caught during the last ten years from the annual Spring Demersal Longline Survey (Pinho, 2005 WD; Menezes *et al.*, 2006). The species was also not frequent on other punctual surveys using different gear configuration (Menezes *et al.*, 2009).

Cpue

There are very limited cpue data available for the ICES area and corresponds to the historical Azorean fishery (see Heessen, 2003 and ICES, 2003).

Length distributions

Length data in the Azores region (ICES Area 10) was not collected in a systematic way along time. Length data available from the fishery was punctually collected from 1982

to 1987 and was reported by Silva (1988). Males length frequency range from 98 cm (age 5) to 132 cm (age 13), with a mode on 115 cm (age 9), and females from 119 cm (age 6) to 162 cm (age 25), with a mode on 142 cm (age 11).

Life-history information

There is very limited biological information reported for this species and there is no routine monitoring of length, weight and maturity-at-age for either survey or commercial catches. The biology of the species is poorly known. The available biological information on Growth and reproduction was reported by Silva (1988).

Kitefin is a viviparous, non-placental species, without uterine compartments and continuous reproduction. In the Azore area copula might occur during August and September and embryonic development is estimated to take about two years which corresponds to a length at birth of 42cm (t=0, Lt=42cm). Males length frequency range from 98 cm (age 5) to 132 cm (age 13), with a mode on 115 cm (age 9), and females from 119 cm (age 6) to 162 cm (age 25), with a mode on 142 cm (age 11).

Exploratory assessment models

Previous studies

Stock assessments of kitefin shark were made during the 1980s, using an equilibrium Fox production model (Silva, 1987). The stock was considered intensively exploited with the average observed total catches (809 t) near the estimated maximum sustainable yield (MSY=933 t). An optimum fishing effort of 281 days fishing bottomnets and 359 man trips fishing with handlines were suggested, corresponding approximately to the observed effort.

During the DELASS project (Heessen, 2003) a Bayesian stock assessment approach using three cases of the Pella-Tomlinson biomass dynamic model with two fisheries (handline and bottom gillnets) was performed (ICES, 2003; 2005). The stock was considered depleted based on the probability of the Biomass 2001 being less than B_{MSY}.

Data exploration and preliminary modelling

Stock assessment

No new assessment of the species status was undertaken in 2010, because no new data were available.

Quality of assessments

No new assessment of the species status was undertaken in 2010, because no new data were available.

Reference points

In common with other deep-water stocks, U_{lim} is set at 0.2* virgin biomass and U_{pa} is set at 0.5* virgin biomass (ICES, 1998).

Management considerations

Kitefin is considered highly vulnerable to overexploitation, as they have a low population productivity, relatively low fecundity and protracted reproductive cycle.

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Table 1. Landings of Kitefin in the North East Atlantic (Tonnes) for the period 1988–2009.

COUNTRY	SUB-AREA	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
France	7, 8	.	.	.	.	.	.	.	.	.	.	.
UK Scotland	5.b, 6	.	.	.	.	.	.	.	.	.	.	.
UK (E&W)	6, 7, 8	.	.	.	.	.	.	.	.	.	.	.
Ireland	10		.	.	.	.	.	.	.	.	.	.
Germany	7	.	.	.	.	.	.	.	.	.	.	.
Portugal	6, 9.a	149	57	7	12	11	11	11	7	4	4	6
Portugal (Azores)	10	549	560	602	896	761	591	309	321	216	152	40
Total		698	617	609	908	772	602	320	328	220	156	46

Table 1. (continued). Landings of Kitefin in the North East Atlantic (Tonnes) for the period 1988–2009.

COUNTRY	SUB-AREA	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
France	7, 8	.	.	.	.		+	+	3	1	.	.
UK Scotland	5.b, 6	.	.	.	.	+	+	8	0	+	.	.
UK (E&W)	6, 7, 8	.	.	.	.	+	+	+	2	5	.	.
Ireland	10	.	.	.	.	.	.	0	.	.	.	.
Germany	7	.	.	.	.	.	.	21	.	.	.	.
Portugal	6, 9.a	14	282	176	5	119	2	3	6	3	1	.
Portugal (Azores)	10	31	31	13	35	25	6	14	10	7	10	6
Total		45	313	189	40	144	9	47	21	14	11	6